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The recent discovery of metallic conduction at the interface between two nonmagnetic (NM) oxide insulators[1,2], such as $LaAlO_3$ (LAO) or Gamma-Al_2O_3 epitaxially grown on $SrTiO_3$ (STO), provides a new opportunity for post-silicon electronics. In particular, the oxide interfaces could be also ferromagnetic (FM). However, direct imaging using a scanning SQUID probe found that the magnetism at LAO/STO was inhomogeneous[3], which in nature are micrometer-sized ferromagnetic patches in the plane parallel to the interface. It was also concluded that the ferromagnetism did not require mobile electrons, i.e. the 2DEG at LAO/STO is NM (mainly paramagnetic). Herein, I will present our study on making the NM oxide 2DEG FM. Specifically, we emulated the proximity-induced magnetism in magnetic semiconductors by combining the 3*d* oxide 2DEG with FM oxides. This results in the observation of anomalous Hall effect (AHE) that probes directly the ferromagnetism of the conducting electrons. The tunable phase diagram of the LAO/STO interface as well as the consistence of ferromagnetic 2DEG and interface superconductivity will be also presented[4].

Reference:

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4. Y. L. Gan, Y. Z. Chen *et al. (unpublished).*